PATENT SPECIFICATION

(11) 1 547 328

(21) Application No. 38596/77 (22) Filed 15 Sept. 1977

(23) Complete Specification filed 19 Jan. 1978

(44) Complete Specification published 13 June 1979

(51) INT. CL.[2] A61M 25/00
A61B 10/00

(52) Index at acceptance
A5R GA

1 547 328

(19)

(54) IMPROVEMENTS IN OR RELATING TO APPARATUS FOR INSERTION INTO A BODY CAVITY

(71) I LOUIS ROGER CELESTIN, a British subject, of 8 Church Avenue, Stoke Bishop, Bristol BS9 1LD do hereby declare the invention, for which I pray that a patent may be granted to me and the method by which it is to be performed, to be particularly described in and by the following statement:

The invention relates to an apparatus for insertion into a body cavity.

According to the invention, there is provided an apparatus for insertion into a body cavity, the apparatus comprising an elongate carrier having at or near one end thereof an element which can be selectively brought into and out of an expanded condition, the carrier having visible markings in the form of a scale to facilitate correct positioning.

The invention also provides an apparatus for insertion into a body cavity, the apparatus comprising an elongate tube, a balloon at or near one end of the tube, and means within said tube for conveying fluid pressure to the balloon interior from a position on the tube remote from the one end, whereby the balloon can be expanded to an expanded condition, the apparatus having visible markings in the form of a scale to facilitate correct positioning.

An apparatus embodying the invention can be used for placing an object, for example an intubation device, in a body cavity, or for withdrawing an object therefrom. The balloon or other expansible element may for this purpose have an outer surface shaped to ensure secure engagement with the object when in the expanded condition. An apparatus embodying the invention can also be used for withdrawing samples from the body cavity, the balloon or expansible element then having the same or a different shape and being provided with brush or like means on its outer surface. The balloon can be expanded in the site to be sampled to bring the brush into contact with the adjacent tissue to collect sample cells therefrom, after which it is withdrawn in the non-expanded condition, with the collected cells retained by the brush.

The balloon or the like of the apparatus of the invention can be resiliently walled to expand under fluid, for example water pressure, to the expanded condition. The tube can contain or constitute means for supplying and releasing the fluid pressure. If the tube or carrier is not itself rigid, a mandrel can be placed within it during insertion to provide necessary rigidity. A fiberoptic endoscope can be employed as a mandrel to allow observation of the positioning of the apparatus.

The invention is further explained below, by way of illustration, with reference to the accompanying schematic drawing, in which:

Figure 1 is a sectional side view of an apparatus embodying the invention; and

Figure 2 is a sectional side view of a modified form of the apparatus within an intubation device.

The apparatus illustrated in Figure 1 comprises a carrier in the form of an elongate tube 1 and an expansible element or balloon 2 mounted on the tube towards one end thereof, which is the insertion end in use. The balloon 2 surrounds the tube 1 so as to have an annular interior extending around the tube. The balloon is made of elastically extensible material for example rubber or latex plastics material so that it can be expanded by increase of fluid pressure in its interior from the collapsed or deflated position indicated by reference numeral 2' and shown in broken line, to the inflated or expanded position shown in solid line, in which it has a generally spherical shape.

The interior of the balloon 2 can be

connected to a source of fluid pressure through a suitable control valve (not shown) by means of a small bore duct 3, which may be a capillary tube. This duct 3 extends along the interior wall surface of the tube 1 between a first aperture 4 in the tube wall, by which the duct 3 communicates with the balloon interior, and a second aperture 5 in the tube wall remote from the balloon 2, through which the duct 3 projects to the control valve. At the outer periphery of the balloon 2 in the expanded condition, a strip 6 of brush-like material, for example a strip of fabric with upstanding pile threads, surrounds the balloon outer surface. The strip 6 may be divided, for example into four portions, one for each quadrant of the balloon 2, instead of being substantially continuous around the balloon, to facilitate expansion and collapse of the balloon under the changes of fluid pressure in its interior.

The tube 1 is of a soft flexible material, which may be the same as or similar to that of the balloon 2. Sufficient rigidity to facilitate manipulation is imparted to the tube 1 in use by a mandrel (not shown), of metal or suitable synthetic material, which can be inserted until its end engages a stop or shoulder constituted by a constriction 7 at the insertion end of the tube.

In use, the insertion end of the tube 1 of the apparatus of Figure 1 is fed into a body cavity, with the balloon 2 in a collapsed or non-expanded condition, until the balloon reaches a desired position.

To facilitate correct positioning the apparatus carries visible markings in the form of a scale, for example a centimetre scale. The apparatus can also be provided with a radio-opaque marking for example a line or lines (not shown) which can comprise a fiberoptic endoscope which ca ncomprise a fiberoptic endoscope which gives adequate rigidity and at the same time permits the surgeon to view the site reached by the balloon to ensure correct positioning.

When the desired position of the balloon 2, typically within or adjacent a tumour, has been reached, water under a suitable pressure head is supplied through the duct 3 to expand the balloon to the condition shown in solid line and thereby force the strip 6 into engagement with the adjacent tissue. The water pressure is then released so that the balloon 2 resumes the collapsed or deflated condition in which it is then withdrawn. Because of the reduction in cross-section of the balloon due to its deflation, the sample cells collected in the strip 6 are retained therein during withdrawal and can be subsequently examined.

It will be evident that the shape and size of the brush 6 and its location on the balloon 2 can be chosen according to the required use, and that the shape of the balloon also can be varied from that shown.

The modified form of the apparatus shown in Figure 2 is intended to be used for placing a hollow article, in particular an intubation device, within a body cavity and for removing such an article therefrom. The apparatus of Figure 1 could be used for such a purpose but that of Figure 2 includes modifications making it better suited for the present purpose. The strip 6 of brush material is not required and is omitted. Moreover, the balloon 12 of the apparatus of Figure 2 has an outer surface, at least in the expanded condition, shaped to provide surface contact with the article. To provide surface contact with the cylindrical inner wall of an intubation device, the balloon 12 has a cylindrical outer wall in the expanded condition as shown in solid line. The shape of the balloon is the collapsed or deflated condition, shown in broken line and indicated by reference numeral 12' is immaterial. In all other respects the apparatus of Figure 2 can resemble that of Figure 1 and like reference numerals are used to indicate similar parts.

In use, the apparatus of Figure 2 is placed within an intubation device 8, shown as being in accordance with Application 11 146/77 (Serial No. 1 518 654), although the apparatus can be employed for placing any suitable kind of intubation or other device within a body cavity. Water under a suitable pressure head is then supplied through the tube 3 to expand the balloon 12 to the expanded condition in which it is in engagement with the inner surface of the wall of the intubation device 8. The flexibility of the balloon wall and its cylindrical shape ensure a tight grip on the device.

A mandrel is then placed inside the tube 1 and the assembly comprising the mandrel, the apparatus and the intubation device 8 is then moved as a whole to locate the device within a body cavity at the desired position. The balloon 12 is then deflated and the apparatus and the mandrel are then withdrawn leaving the device in place.

The tube 1 of either illustrated form of apparatus is not subjected to the fluid pressure but in an alternative arrangement (not shown) the duct 3 is omitted and the tube carries the fluid pressure within the wall, the tube being then of sufficient wall thickness to be effectively non-expansible in response to the pressure.

The apparatus of the invention can of course be embodied in various ways other than as specifically described within the scope of the invention as defined by the following claims.

WHAT I CLAIM IS:

1. An apparatus for insertion into a body cavity, the apparatus comprising an elongate carrier having at or near one end thereof an element which can be selectively brought into and out of an expanded condition, the carrier having visible markings in the form of a scale to facilitate correct positioning.

2. An apparatus as claimed in claim 1 wherein the carrier comprises a tube and the element comprises an expansible balloon around the tube.

3. An apparatus for insertion into a body cavity, the apparatus comprising an elongate tube, a balloon at or near one end of the tube, and means within said tube for conveying fluid pressure to the balloon interior from a position on the tube remote from the one end, whereby the balloon can be expanded to an expanded condition, the apparatus having visible markings in the form of a scale to facilitate correct positioning.

4. An apparatus as claimed in claim 2 or 3 wherein the balloon outer surface carries brush means arranged to collect cells from body tissue constituting the adjacent surface.

5. An apparatus as claimed in claim 4 wherein the brush means has the form of a strip extending circumferentially around the balloon.

6. An apparatus as claimed in any one of claims 2 to 5 wherein the balloon is generally spherical in shape in the expanded condition.

7. An apparatus as claimed in any one of claims 2 to 5 wherein the balloon has a generally cylindrical shape in the expanded condition.

8. An apparatus as claimed in any one of claims 2 to 7 wherein the tube is flexible and arranged to receive a mandrel therein to facilitate positioning the balloon within a body cavity.

9. An apparatus as claimed in any one of claims 2 to 8 wherein a fluid pressure supply duct extends within the tube between first and second apertures in the tube wall, the apertures communicating the duct interior with the balloon interior and with a fluid pressure source respectively.

10. An apparatus as claimed in any one of claims 2 to 9 wherein the balloon is of resilient material.

11. An apparatus as claimed in any preceding claim wherein the scale is a centimetre scale.

12. An apparatus as claimed in any preceding claim having radio-opaque markings on the carrier.

13. An apparatus as claimed in claim 12 wherein the radio-opaque markings are visible.

14. An apparatus for insertion into a body cavity substantially as herein described with reference to Figure 1 or Figure 2 of the accompanying drawing.

POLLAK MERCER & TENCH
Chartered Patent Agents
Chancery House
53-64 Chancery Lane
London WC2A 1HJ
and
Eastcheap House
Central Approach
Letchworth
Hertfordshire SG6 3DS
Agents for the Applicant.

Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1979.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

1547328 COMPLETE SPECIFICATION
1 SHEET This drawing is a reproduction of the Original on a reduced scale

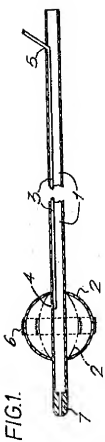

FIG.1.

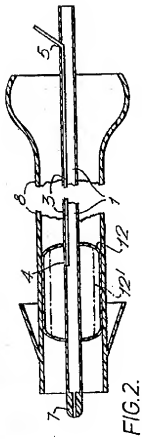

FIG.2.